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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,175	07/08/2003	Hideaki Fujita	0397-0465P	6455

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EXAMINER	
MARKHAM, WESLEY D	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 08/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/614,175	FUJITA ET AL.	
	Examiner	Art Unit	
	Wesley D Markham	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *2 and 7* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6 and 8-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/539,385.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/8/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1, 3, 4 (as it depends from 1), 5 (as it depends from 1), 6, and 8 – 13, drawn to a method for producing an optical device by baking an applied film under vacuum of 1 Torr or lower, classified in class 427, subclass 350.

   II. Claims 2, 4 (as it depends from 2), 5 (as it depends from 2), and 7, drawn to a method for producing an optical device by baking an applied film under gaseous nitrogen, classified in class 427, subclass 385.5.

2. The inventions are distinct, each from the other because of the following reasons: Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case, the different inventions are not disclosed as capable of use together (i.e., either the film is baked under a vacuum of 1 Torr or lower, or the film is baked under nitrogen gas). Additionally, the inventions have different modes of operation (i.e., because one method bakes the film under vacuum and the other method bakes the film under nitrogen gas) and different effects. For example, see pages 9, 10, and 13, and Figures 2 and 4, of the applicant's specification, in which the applicant discusses the differences between the film produced by baking under vacuum ("Condition A", which yields a film having a desirably high light

transmittance) and the film produced by baking under nitrogen gas ("Condition B", which yields a film having a significantly lower transmittance so that it is "practically unfeasible for optical devices...").

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and recognized divergent subject matter, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. R. Gallagher on 8/2/2004, a provisional election was made without traverse to prosecute the invention of Group I, Claims 1, 3, 4 (as it depends from 1), 5 (as it depends from 1), 6, and 8 – 13. Affirmation of this election must be made by applicant in replying to this Office Action. Claims 2, 4 (as it depends from 2), 5 (as it depends from 2), and 7 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Response to Amendment

6. Acknowledgement is made of the preliminary amendment filed by the applicant on 7/8/2003, in which the appropriate continuity data referencing parent application 09/539,385 was inserted into the specification.

Information Disclosure Statement

7. The IDS filed by the applicant on 7/8/2003 is acknowledged, and the references listed thereon have been considered by the examiner as indicated on the attached copy of the PTO-1449 form.

Drawings

8. The eight (8) sheets of formal drawings filed by the applicant on 7/8/2003 are acknowledged and approved by the examiner.

Specification

9. The lengthy specification (21 pages, exclusive of the claims) has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

10. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required. After reviewing the specification as a whole, the examiner

notes that the subject matter of **Claim 3**, specifically that the organic polymer film has an absorptivity coefficient of light of not more than 1.6 mm^{-1} in the wavelength of 650 nm, lacks antecedent basis in the specification.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1, 4 (as it depends from 1), 5 (as it depends from 1), 6, and 8 – 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. Regarding independent **Claim 1** (from which **Claims 4 – 6** and **8 – 13** depend), the term "high transmittance" in Claim 1 is a relative term which renders the claims indefinite. The term "high transmittance" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Specifically, the examiner has reviewed the applicant's specification as a whole and notes that the term "high transmittance" is not defined or discussed in a manner that would allow one skilled in the art to ascertain the scope of the claimed invention. For example, there is no indication in the specification as to what the threshold value of light transmittance is for the transmittance to be considered "high"

(i.e., what level of light transmittance is required for the transmittance to be "high"?) Additionally, there does not appear to be an art-recognized definition of the term "high transmittance". For these reasons, the scope of Claims 1, 4 – 6, and 8 – 13 is unclear, and the claims are indefinite. Please note that Claim 3 has not been rejected on this basis because it sets forth a specific light absorption coefficient of the film, thereby allowing one skilled in the art to determine the scope of the claimed invention.

14. **Claim 6** recites the limitation "the polyimide resin film" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim because neither Claim 6, nor Claim 1 from which it depends, previously refers to or recites a polyimide resin film. As such, the scope of Claim 6 is unclear (i.e., because it is unclear to what "the polyimide resin film" refers).

15. Regarding **Claims 11 – 13**, the claims recite, in part, "(photosensitive) polyimide type resin (film)". This is in contrast to Claims 5 and 6, which recite, in part, "polyimide resin film". This contrasting claim language renders the scope of Claims 11 – 13 unclear and the claims vague and indefinite because one skilled in the art would not be reasonably apprised of the difference(s) between a polyimide resin film (as recited in some claims) and a polyimide type resin film (as recited in other claims). For example, what type of film qualifies as a polyimide type resin but not a polyimide resin? Is there any difference at all, or is the applicant simply using the terms interchangeably?

Claim Observations

16. Regarding Claim 11, the examiner has reasonably interpreted, "an acetophenone type resin film" to be a resin film that either contains a moiety / functional group based on acetophenone or is formed by using compounds or molecules based on acetophenone.

Claim Rejections - 35 USC § 102

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claims 1, 4, 5, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Shoji et al. (USPN 4,748,228).

19. Regarding independent **Claim 1**, Shoji et al. teaches a method of producing a device having an organic polymer film, the method comprising applying a solution containing an organic polymer film-forming starting material on a substrate to form an applied film, and then baking the applied film under a vacuum of 1 Torr or lower to form the organic polymer film (Abstract, Col.4, lines 19 – 67, and Col.5, lines 1 – 3). The organic polymer film is a polyimide resin film (Abstract, Col.1, lines 9 – 14, and Col.4, lines 19 – 28), and the film-forming starting material is a precursor of a polyimide type resin (Col.4, lines 45 – 68, and Col.5, line 1), as required by **Claims 5**

and 13. Shoji et al. does not explicitly teach that the method is, "for producing an optical device having an organic polymer film through which a light beam is transmitted", as recited in the preamble of Claim 1. However, this statement in the preamble of the claim simply recites the "intended use" of the claimed method. This "intended use" cannot be the basis for the patentability of the claims, since the process taught by Shoji et al. is identical to the applicant's claimed process. As such, the process of Shoji et al. necessarily produces an optical device having an organic polymer film through which a light beam can be transmitted (i.e., the same device recited in the preamble of Claim 1). Further, Shoji et al. does not explicitly teach that the organic polymer film has a high transmittance when the light beam has a wavelength of 1.5 microns or shorter (Claim 1), specifically a wavelength of 500 nm to 800 nm (as recited in **Claim 4**). However, as discussed above in regards to Claim 1, the process taught by Shoji et al. is the same as the applicant's claimed process, including the type of polymer film deposited (i.e., a polyimide film) and the degree of vacuum utilized during the baking process (i.e., lower than 1 Torr). Therefore, unless essential process steps and/or limitations are missing from the applicant's claims, the process of Shoji et al. would have inherently produced an organic polymer film having a high transmittance when a light beam has a wavelength of 1.5 microns or shorter, specifically a wavelength of 500 nm to 800 nm.

20. Claims 1, 4, 5, 8, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Burgoyne et al. (USPN 4,954,144).

21. Regarding independent **Claim 1**, Burgoyne et al. teaches a method of producing a device having an organic polymer film, the method comprising applying a solution containing an organic polymer film-forming starting material on a substrate to form an applied film, and then baking the applied film under a vacuum of 1 Torr or lower to form the organic polymer film (Abstract, Col.4, lines 30 – 52). The organic polymer film is a polyimide resin film (Abstract, Col.4, lines 44 – 45), and the film-forming starting material is a precursor of a polyimide type resin (Col.4, lines 15 – 38), as required by **Claims 5 and 13**. The thickness of the film is around 100 microns (Col.4, lines 39 – 40), which is within the range of thickness values claimed by the applicant in **Claim 8**. Burgoyne et al. does not explicitly teach that the method is, "for producing an optical device having an organic polymer film through which a light beam is transmitted", as recited in the preamble of Claim 1. However, this statement in the preamble of the claim simply recites the "intended use" of the claimed method. This "intended use" cannot be the basis for the patentability of the claims, since the process taught by Burgoyne et al. is identical to the applicant's claimed process. As such, the process of Burgoyne et al. necessarily produces an optical device having an organic polymer film through which a light beam can be transmitted (i.e., the same device recited in the preamble of Claim 1). Further, Burgoyne et al. does not explicitly teach that the organic polymer film has a high transmittance when the light beam has a wavelength of 1.5 microns or shorter (Claim 1), specifically a wavelength of 500 nm to 800 nm (as recited in **Claim 4**). However, as discussed above in regards to Claim 1, the process taught by Burgoyne et al. is the same as

the applicant's claimed process, including the type of polymer film deposited (i.e., a polyimide film) and the degree of vacuum utilized during the baking process (i.e., lower than 1 Torr). Therefore, unless essential process steps and/or limitations are missing from the applicant's claims, the process of Burgoyne et al. would have inherently produced an organic polymer film having a high transmittance when a light beam has a wavelength of 1.5 microns or shorter, specifically a wavelength of 500 nm to 800 nm.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

23. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

24. Claims 1, 4 – 6, 8, 10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okaniwa (USPN 5,694,513) in view of Matsuura et al. (USPN 5,108,201) and Matsuyama et al. (USPN 4,686,147).

25. Regarding independent **Claim 1**, Okaniwa teaches a method for producing an optical device, specifically an optical waveguide, having an organic polymer film through which a light beam is transmitted, the method comprising applying a solution containing an organic polymer film-forming starting material on a substrate to form an applied film, and then baking the applied film to form the organic polymer film, wherein the organic polymer film has a low optical loss (i.e., a "high transmittance") when the light beam has a wavelength of 1.5 microns or shorter (Abstract, Col.1, lines 5 – 7, Col.2, lines 39 – 67, Col.4, lines 45 – 57, Col.7, lines 15 – 53, Col.8, lines 42 – 50, Col.9, lines 30 – 40, Example 5, and Col.11, lines 20 – 27). Okaniwa does not explicitly teach that the baking takes place under a vacuum of 1 Torr or lower. Specifically, Okaniwa teaches that the baking takes place in a nitrogen-purged oven and is silent regarding the pressure in the oven (Col.10, lines 41 – 64). However, Okaniwa does suggest that that material (i.e., the polyimide) used to produce the optical waveguide should have high heat resistance (Col.1, lines 54 – 57, and Col.2, line 8). Matsuura et al. also teaches that, in the art of producing a polyimide optical waveguide, high heat resistance is a desirable pre-requisite for the optical waveguide because the waveguide must be able to withstand high temperatures generated during the processing of electronic components with which the waveguide is associated (Col.1, lines 6 – 23, Col.2, line 15, and Col.5, lines 51 – 58).

Matsuyama et al. teaches that, in the art of heat-curing / baking a polyimide resin film, it is most desirable to perform such heat-curing / baking in a non-oxidizing atmosphere under a reduced pressure such as 0.1 Pa or below (i.e., a vacuum of 1 Torr or lower), or in a vacuum, so that the heat resistance of the polyimide layer is remarkably enhanced due to the curing in a vacuum as compared to a case in which the curing is carried out in air or a nitrogen atmosphere (Abstract, Col.5, lines 8 – 12 and 32 – 68, Col.6, lines 1 – 13, and Examples 3 and 6, which directly compare the heat resistance of a polyimide film baked in a vacuum of less than 1 Torr (e.g., 10^{-4} Pa) with the heat resistance of a polyimide film baked in a nitrogen atmosphere). Therefore, it would have been obvious to one of ordinary skill in the art to perform the oven baking process of Okaniwa under a reduced pressure of 0.1 Pa or below (i.e., below 1 Torr), or in a vacuum, as taught by Matsuyama et al., as opposed to a nitrogen atmosphere (as taught by Okaniwa) with the reasonable expectation of successfully and advantageously performing the baking / heat curing of the polyimide film under conditions that (1) do not oxidize the film, and (2) produce a polyimide film having an improved heat resistance, which is taught by both Okaniwa and Matsuura et al. to be a desirable quality in polymeric optical waveguides.

Regarding **Claim 4**, the combination of Okaniwa, Matsuura et al., and Matsuyama et al. does not explicitly teach that the light beam (to which the organic polymer film has a "high transmittance") has a wavelength of 500 to 800 nm. However, as set forth above in the discussion of Claim 1, the combination of Okaniwa, Matsuura et al., and Matsuyama et al. teaches all the limitations of the applicant's process, such

as the type of film deposited (i.e., a polyimide film) and the degree of vacuum used in the baking process (i.e., less than 1 Torr). Therefore, the process of the combination of Okaniwa, Matsuura et al., and Matsuyama et al. would have inherently produced a polymer film having a "high transmittance" to light of a wavelength of 500 nm to 800 nm. Regarding **Claims 5, 6, and 13**, the combination of Okaniwa, Matsuura et al., and Matsuyama et al. teaches that the organic polymer film is a polyimide film, particularly a photosensitive polyimide resin film, and the associated film-forming starting material is a precursor of a polyimide type resin (Col.2, lines 39 – 67, Cols.3 – 6, Col.7, lines 1 – 45, Col.8, lines 42 – 50, Col.9, lines 30 – 40, and Example 5 of Okaniwa). Regarding **Claim 8**, Okaniwa teaches that the thickness of the organic polymer film is not less than 5 microns and not more than 200 microns (Col.10, lines 50 – 52). Regarding **Claim 10**, the combination of Okaniwa, Matsuura et al., and Matsuyama et al. does not explicitly teach that the baking is performed under a vacuum of 1×10^{-2} Torr. However, Matsuyama et al. generally suggests that the baking should be performed in a non-oxidizing atmosphere, such as in a vacuum (i.e., a pressure below atmospheric pressure, or below 760 Torr) (Col.5, lines 9 – 12, 35, 45, and 56 – 58). This range of pressures encompasses the applicant's claimed pressure value of 1×10^{-2} Torr. It would have been obvious to one of ordinary skill in the art to perform the baking process of the combination of Okaniwa, Matsuura et al., and Matsuyama et al. at any degree of vacuum (e.g., below 760 Torr, at 1×10^{-2} Torr, below 0.1 Pa (as also taught by Matsuyama et al.), etc.) with the reasonable expectation of successfully and

advantageously producing a polyimide film having a higher heat resistance than when the baking is performed in air or nitrogen gas.

26. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okaniwa (USPN 5,694,513) in view of Matsuura et al. (USPN 5,108,201) and Matsuyama et al. (USPN 4,686,147), in further view of Yamagishi et al. (USPN 5,837,804).

27. The combination of Okaniwa, Matsuura et al., and Matsuyama et al. teaches all the limitations of **Claims 3 and 4** as set forth above in paragraph 25, except for a process wherein the organic polymer film has a "high transmittance" of light with a wavelength of 500 nm to 800 nm, specifically an absorptivity coefficient of light of not more than 1.6 mm^{-1} in the wavelength of 650 nm. Specifically, the combination of Okaniwa, Matsuura et al., and Matsuyama et al. is silent regarding the specific transmittance / absorptivity coefficient of light at the wavelengths claimed by the applicant. However, the combination of Okaniwa, Matsuura et al., and Matsuyama et al. does teach that the polyimide waveguide material should have a low optical loss (i.e., a high light transmittance) (Abstract, Col.2, lines 43 – 44, and Col.9, lines 36 – 40 of Okaniwa; Abstract, Col.1, line 21, and Col.2, line 13 of Matsuura et al.). Yamagishi et al. teaches that, in the art of producing polyimide optical waveguides, the polyimide waveguiding material should have an excellent transparency and an optical loss at a wavelength of 700 nm to 1.6 microns of 1 dB/cm or less (Abstract). Importantly, Yamagishi et al. teaches that the optical loss (and therefore the

transmittance / optical absorptivity coefficient) of the polyimide can easily be adjusted by the proper choice of the kinds and amounts of the components used to produce the polyimide (Col.5, lines 4 – 10). Therefore, it would have been obvious to one of ordinary skill in the art to use the optimal kinds and amounts of polyimide film-forming components in the process of the combination of Okaniwa, Matsuura et al., and Matsuyama et al. so as to obtain a polyimide optical waveguide having the optimum transmission characteristics at the wavelength desired by the purveyor in the art. In other words, since it is clear from Okaniwa and Matsuura et al. that a low optical loss is desired, it would have been obvious to one of ordinary skill in the art to minimize the optical absorptivity coefficient (e.g., to below the level claimed by the applicant) and maximize the light transmittance of the polyimide waveguide material by using the correct kinds and proportion of film-forming components, as taught by Yamagishi et al., thereby producing a waveguide having a minimized optical loss.

28. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okaniwa (USPN 5,694,513) in view of Matsuura et al. (USPN 5,108,201) and Matsuyama et al. (USPN 4,686,147), in further view of Fan et al. (USPN 5,054,872).

29. The combination of Okaniwa, Matsuura et al., and Matsuyama et al. teaches all the limitations of **Claim 9** as set forth above in paragraph 25, except for a process wherein the applied film is heated under atmospheric pressure before the baking under vacuum. However, Okaniwa does teach that the applied film is heated on a hot plate for a short amount of time to evaporate the solvent before baking the film

(Col.4, line 52, Col.10, lines 50 – 53). No mention is made of performing the solvent evaporation step under a vacuum or a reduced pressure. Fan et al. teaches that, in the art of producing a polymeric optical waveguide, a coated substrate is typically baked at atmospheric pressure for several minutes to drive-off the solvent (Abstract, Col.11, lines 21 – 30). It would have been obvious to one of ordinary skill in the art to perform the step of heating the applied film on a hot plate to evaporate the solvent, as taught by Okaniwa, at atmospheric pressure with the reasonable expectation of (1) success, as Okaniwa does not teach or suggest that such solvent evaporation should be carried-out under either reduced or raised pressure, and Fan et al. teaches that such a solvent removal process is typically carried out at atmospheric pressure, and (2) obtaining the benefits of evaporating the solvent at atmospheric pressure, such as performing the process as simply as possible (i.e., without needing to alter the pressure during the solvent removal step).

30. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okaniwa (USPN 5,694,513) in view of Matsuura et al. (USPN 5,108,201) and Matsuyama et al. (USPN 4,686,147), in further view of Tesoro et al. (USPN 4,656,235).

31. The combination of Okaniwa, Matsuura et al., and Matsuyama et al. teaches all the limitations of **Claim 10** as set forth above in paragraph 25, except for a process wherein the baking is performed under a vacuum of 1×10^{-2} Torr. However, Matsuyama et al. generally suggests that the baking should be performed in a non-oxidizing atmosphere, such as in a vacuum (Col.5, lines 9 – 12, 35, 45, and 56 –

58). Tesoro et al. teaches that, in the art of curing a polyimide film in a vacuum oven, the conditions in the oven are selected from a "workable range" in which the oven operates (Col.5, lines 32 – 45). Therefore, it would have been obvious to one of ordinary skill in the art to select and use a pressure in the vacuum baking process of the combination of Okaniwa, Matsuura et al., and Matsuyama et al. from the workable (i.e., operable) range of pressures of the specific vacuum oven utilized in the process. One of ordinary skill in the art would have done so with the reasonable expectation of successfully producing a polyimide film having a high heat resistance, regardless of the exact degree of vacuum used in the baking process (i.e., regardless of whether the degree of vacuum is slightly above or below 0.1 Pa, which is a pressure explicitly taught by Matsuyama et al.).

32. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okaniwa (USPN 5,694,513) in view of Matsuura et al. (USPN 5,108,201) and Matsuyama et al. (USPN 4,686,147), in further view of Nomura et al. (USPN 5,310,862).

33. The combination of Okaniwa, Matsuura et al., and Matsuyama et al. teaches all the limitations of **Claims 11 and 12** as set forth above in paragraph 25, except for a process wherein the photosensitive polyimide resin is an acetophenone type resin (Claim 11) and includes a tertiary amine (Claim 12). However, Okaniwa does suggest that the photosensitive group used in the photosensitive polyimide resin is not particularly limited and can be introduced into the polyimide by "a conventional

method" (Col.4, lines 60 – 67, Col.5, lines 1 – 5, and Col.7, lines 28 – 45). Nomura et al. teaches that, in the art of producing a photosensitive polyimide resin composition (Abstract), the compound having photoreactivity is preferably a tertiary amine (Col.7, formula (9)) because such amino compounds have a high photoreactivity, thereby allowing less of the compound to be used in the polyimide-forming composition / solution (Col.7, lines 40 – 68, Col.8, lines 1 – 38). Further, Nomura et al. teaches that a photopolymerization initiator such as one based on acetophenone (Col.9, lines 40 – 48) should be incorporated into the film forming composition in order to increase the photosensitivity of the composition (Col.9, lines 40 – 68, Col.10, lines 1 – 17). Therefore, it would have been obvious to one of ordinary skill in the art to incorporate an acetophenone-type component and a tertiary amine into the polyimide resin of the combination of Okaniwa, Matsuura et al., and Matsuyama et al. with the reasonable expectation of successfully and advantageously (1) using a photosensitive group (i.e., the tertiary amine) that is highly photosensitive so that less of the component needs to be utilized, and (2) increasing the photosensitivity of the composition due to the acetophenone-based component.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Khanarian et al. (USPN 5,064,265) teaches producing an optical waveguide having high transparency by coating a polymeric solution on a substrate and then heating / drying the layer in a vacuum oven.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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